Using Predictive Modeling to Improve Outcomes
For Children in Allegheny County

Training for Child Welfare Professionals

Agenda

- Objectives
- Overview of Predictive Analytics/Predictive Risk Modelling
- Application of Predictive Analytics in Allegheny County
- Policy/Practice
- Case scenarios
- Process changes
- KIDS Changes/Design
- Questions

Objectives

By the end of this training, participants will be able to…

- Understand the basics of Predictive Analytics/Predictive Risk Modeling
- Describe how the Family Screening Score will be generated in KIDS
- Understand what the Family Screening Score means
- Explain how the Family Screening Score is to be included in making screening decisions and the policy for its use
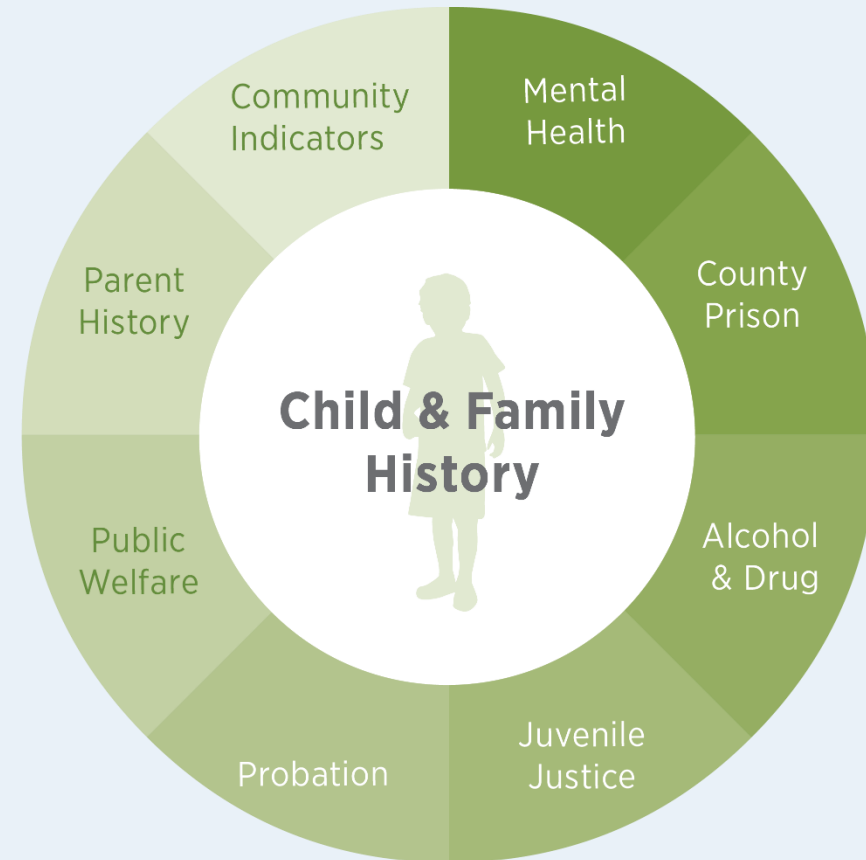- Understand the addition of dynamic text from Client View to a referral in KIDS

What is Predictive Risk Modeling?

- In Allegheny County, rich data are available to workers and supervisors to help inform decisions at call screening, but

  - No standardized protocols for using these data to inform screening decisions
  - No method for systematically weighting this information in an equitable manner across all referrals
  - No understanding of what information is correlated / predicts future adverse outcomes for children

- Is there a way to address any of these concerns?

Child & Family History

- Community Indicators
- Mental Health
- County Prison
- Alcohol & Drug
- Juvenile Justice
- Probation
- Public Welfare
- Parent History
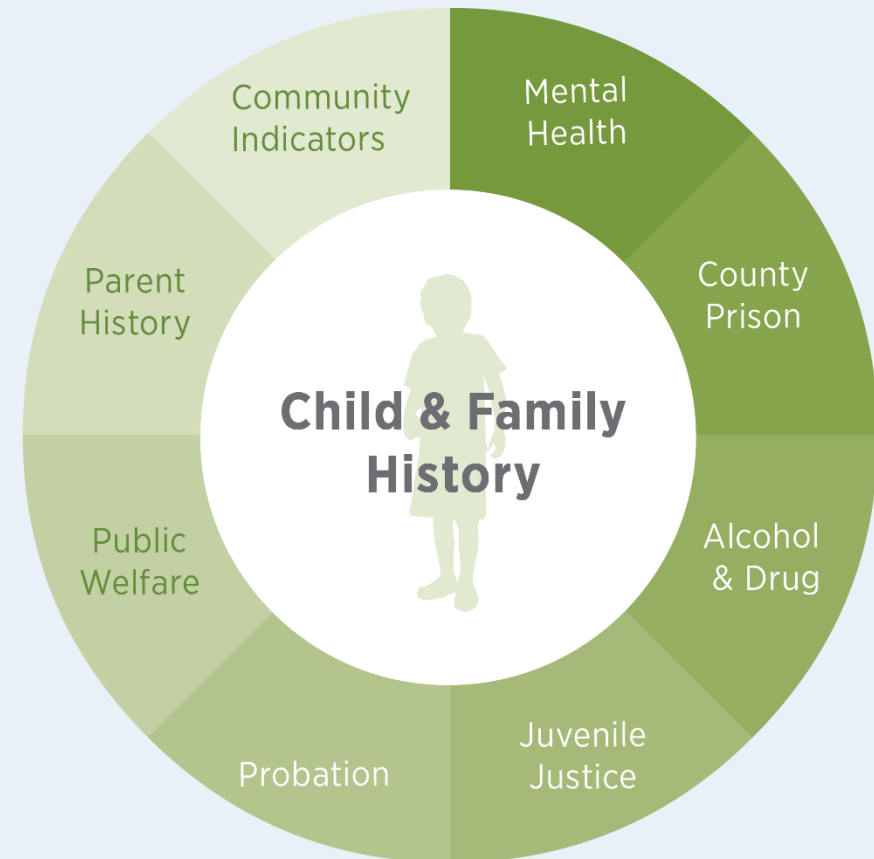
What is Predictive Risk Modeling?

- Use data **already collected** about each child to evaluate the possibility of future adverse outcomes

- Why consider predictive risk modeling?

  - Wider availability of high quality information about service interactions that can inform our understanding of risk and protective factors

  - Advances in technology and analytic capabilities- we can use these data in real time rather than retrospective analyses

  - Difficulty in weighting complex factors (and time is scarce!)

How is Predictive Analytics Being Applied in Allegheny County?

Developing a Screening Score

- We **developed a partnership** with a research team based in New Zealand

- We shared Allegheny County data with the research team to **analyze for factors that would be predictive of future maltreatment**

- **Call screening was selected** as the decision point at which a model would be developed and used

- The team developed a model that includes more than **100 pieces of information**

- This screening score is comprised of the **likelihood of re-referral**, given screen-out and the **likelihood of placement in foster care**, given screen-in

Community Indicators · Mental Health · County Prison · Alcohol & Drug · Juvenile Justice · Probation · Public Welfare · Parent History

Child & Family History

Running a Screening Score

- The tool is called the **Allegheny Family Screening Tool**

- The score that will be produced is called the **Family Screening Score**

- The score will be run in the KIDS system which will **harvest data from** the data warehouse*

- At each call, a **screening score** will be run for each child associated with an allegation of maltreatment

- Only **one score will be displayed** to the screener- the highest score for the highest child on that referral

- The score only **applies at call screening**

- The score will **only be viewed by call screeners** and call screening supervisors

Developing a Screening Score

- The **screening score** is from 1 to 20 (with a subset of referrals being mandatory screen ins)

- The **higher the score, the higher the chance of the future event**
(e.g., abuse, placement, re-referral) according to the data

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |

1 in 20
calls receive
a **score of 1**
(bottom 5% of risk)

1 in 20
calls receive
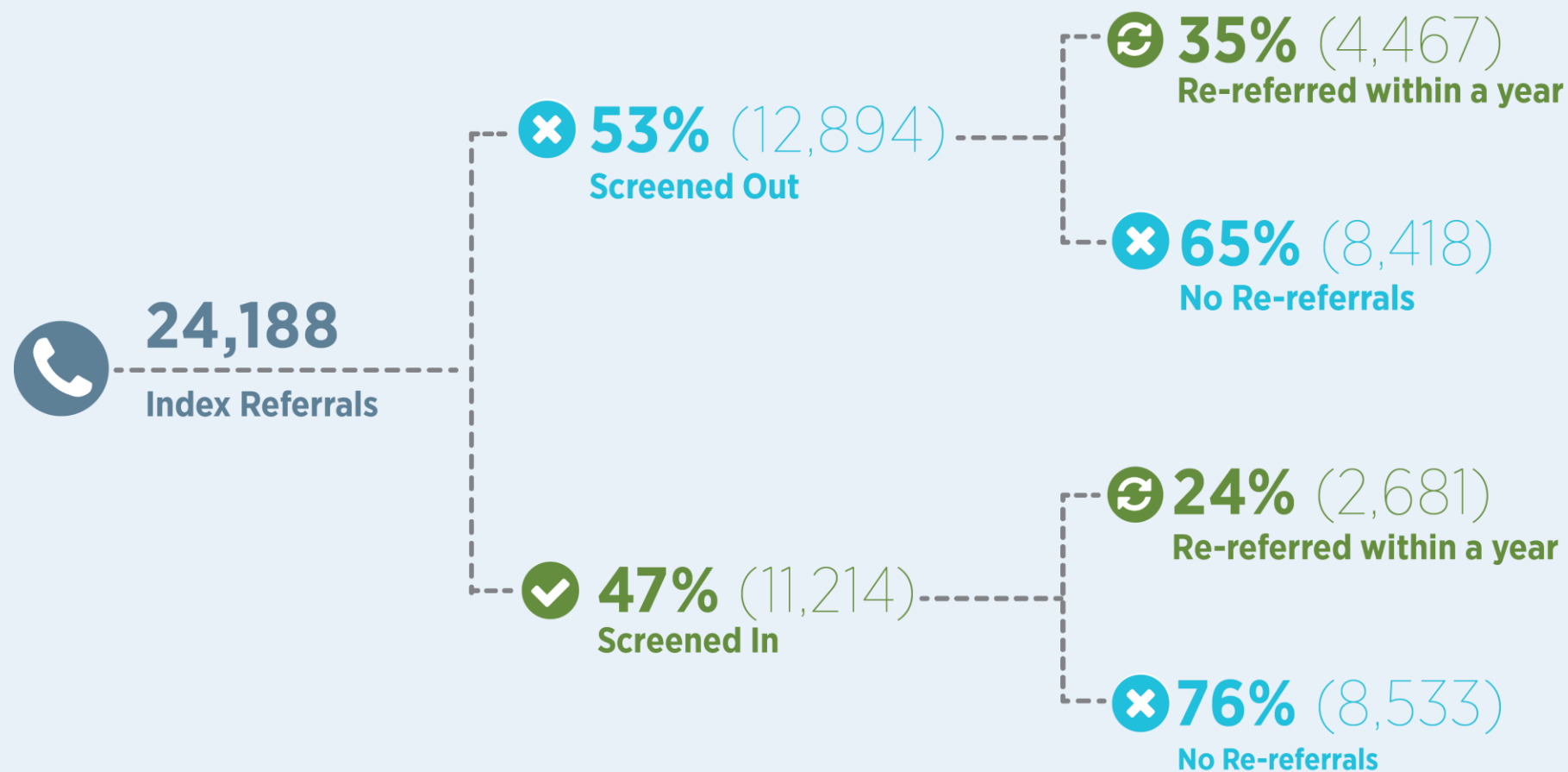a **score of 20**
(top 5% of risk)

Okay.

But will it work? Will it actually give me a score that reflect this family's likelihood of future maltreatment?

To test that, we **scored thousands of historical maltreatment calls** and **then followed the children in subsequent referrals to** see how often the model was correct...

Developing the model

24,188
Index Referrals

53% (12,894)
Screened Out

47% (11,214)
Screened In

35% (4,467)
Re-referred within a year

65% (8,418)
No Re-referrals

24% (2,681)
Re-referred within a year

76% (8,533)
No Re-referrals

The Results: Re-Referrals

1 in 10 children with a score of 1 were re-referred within two years of the call.

9 in 10 children with a score of 20 were re-referred within two years of the call.

1 in 100 children who received **a score of 1 were placed out-of-home** within 2 years of the call

The Results:
Out-of-Home Placements

1 in 2 children
who received
a score of 20 were placed out-of-home within
2 years of the call

Under current practice:

**27% of highest risk cases
were screened out —**
  of these, **1 in 3 are re-referred
  and placed** within 2 years of the
  initial screened out call

**48% of lowest risk cases
were screened in —**
  only 1.4% of those
  are placed within 2 years.

Approaches to Assessing Risk

	PA Risk Assessment	Family Screening Score
Definition	Likelihood of future maltreatment	Likelihood of future re-referral or placement
Based on	Clinical judgement of worker	Data driven
Timeframe	Future	Within two years of call
Type assessed	Acute and chronic	Chronic only
Considers	All aspects of the family life relevant to future maltreatment (allegations, family stressors, prior history)	All factors found to be predictive through modeling of all Data Warehouse variables for CYF referrals 2010 - 2013
Includes	15 factors	Over 100 factors
Applies	At all critical child welfare decision points and when new information arises	Only at call screening decision
Output	Overall Severity: seriousness of what has happened Overall Risk: likelihood of future harm	Highest score for highest child for likelihood of either re-referral or placement

What is the Policy and Process for
Using the Family
Screening Score?

The Allegheny County Office of Children, Youth, and Families (OCYF) Call Screening Department will employ the Allegheny Family Screening Tool as one of the tools used in determining a screening decision for all incoming referrals.
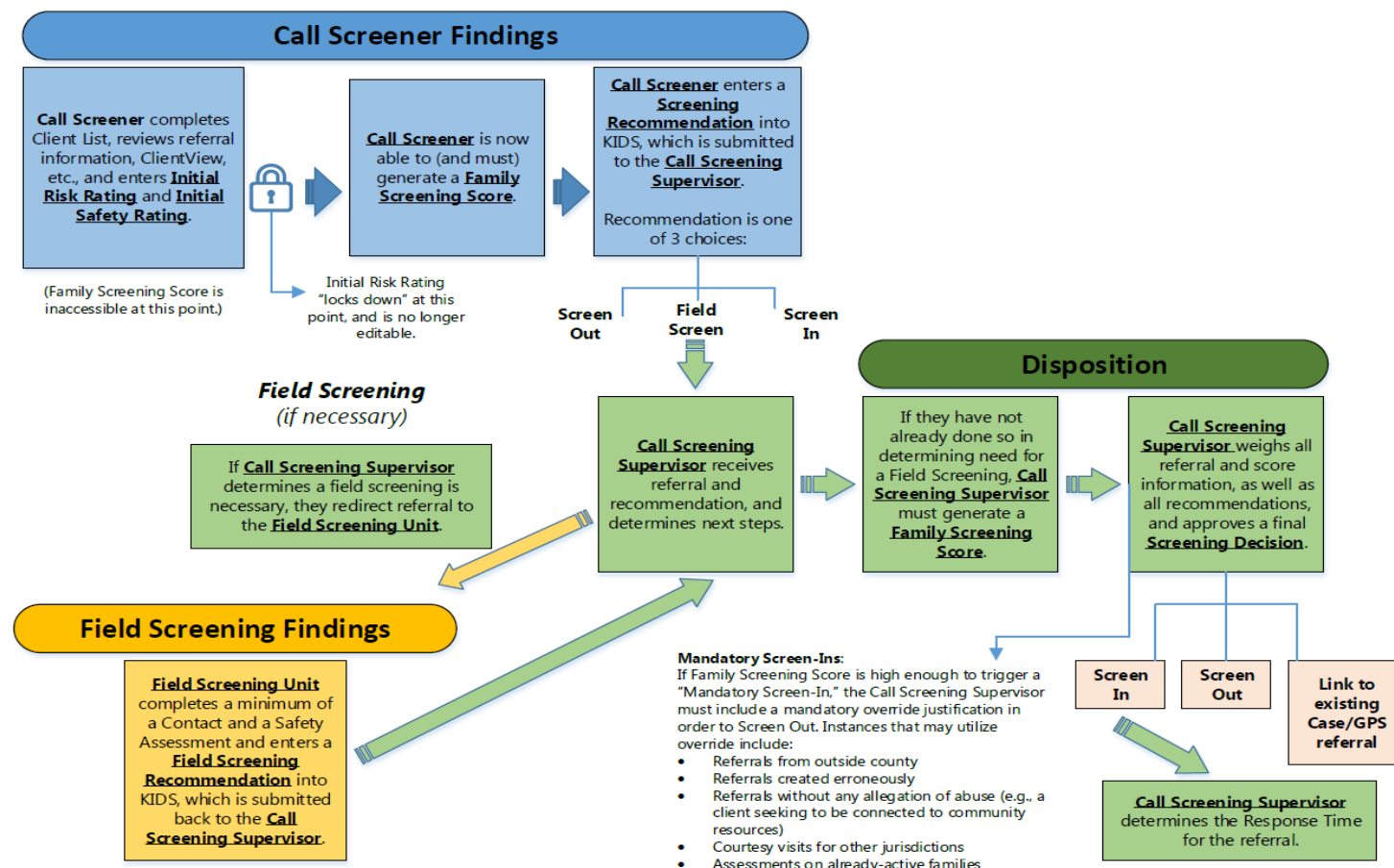
Process change

- Screeners will still…
  - Take call and record information
  - Generate client list
  - Review previous CYF history, Client View, other sources of information

- Screeners will now…
  - Complete a risk and safety rating
  - Review the Family Screening Score
  - Offer a recommendation
  - Send the referral for approval to the supervisor

Process Change at Call Screening

Revised business process

(easier to read views in subsequent slides)

New Call Screening Business Process

*Incorporating Family Screening Score utilization and Other 8/1/16 KIDS changes*

Call Screener Findings

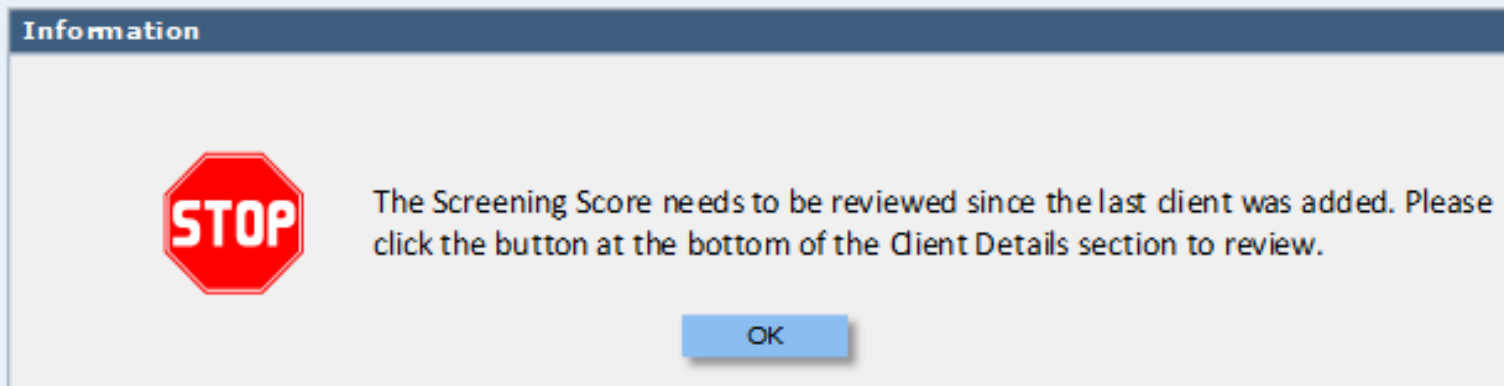**Call Screener** completes Client List, reviews referral information, ClientView, etc., and enters **Initial Risk Rating** and **Initial Safety Rating**.

(Family Screening Score is inaccessible at this point.)

Call Screener is now able to (and must) generate a **Family Screening Score**.

Initial Risk Rating "locks down" at this point, and is no longer editable.

Call Screener enters a **Screening Recommendation** into KIDS, which is submitted to the **Call Screening Supervisor**.

Recommendation is one of 3 choices:

Screen Out   Field Screen   Screen In

Assessing Risk at Call Screening

- Review of risk factors

- Explanation of process at call screening

Process change
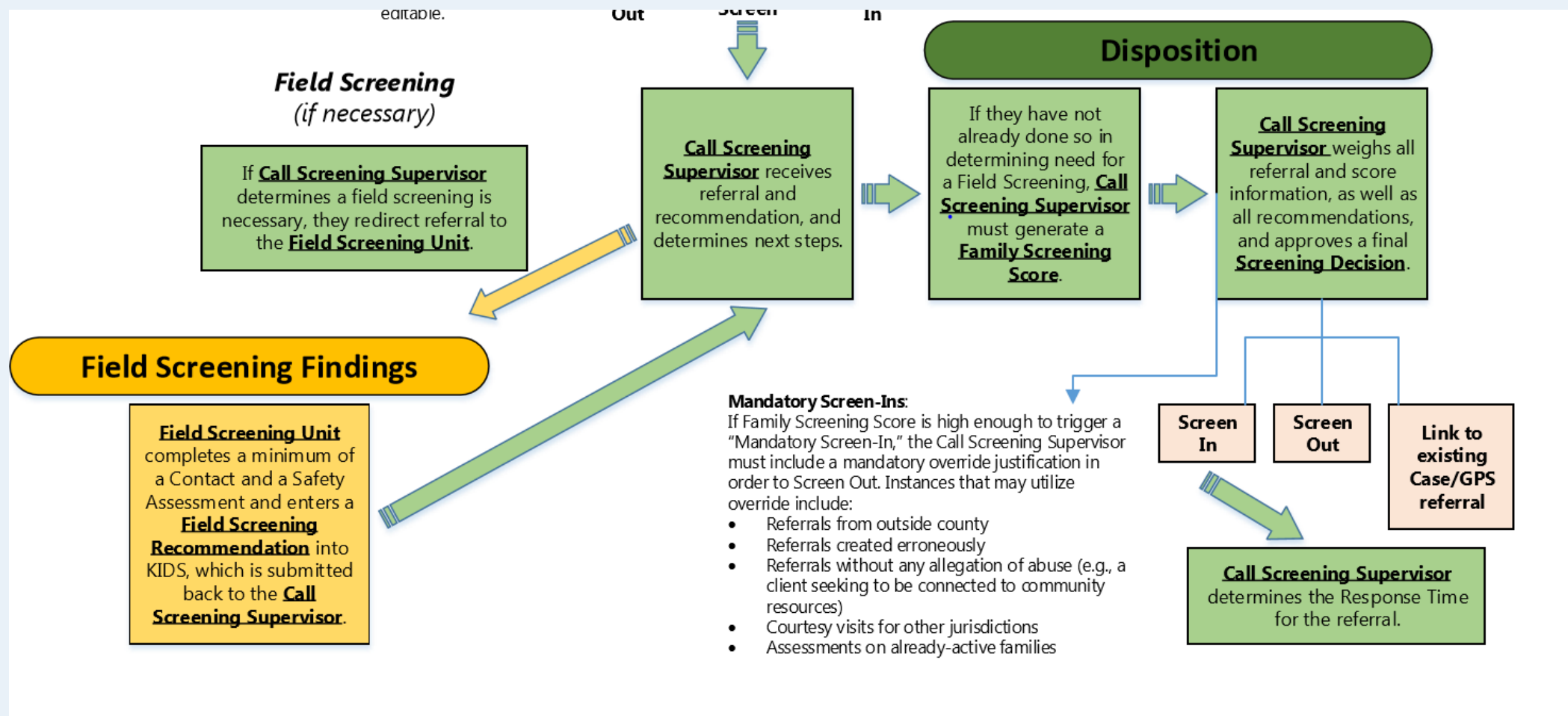
- The button to generate a FSS is located in two places:

  – Client details tab of call info screen

  – Outcome screen

- The score must be generated:

  – By the screener, after entering risk and safety ratings and prior to making a recommendation

  – By a supervisor, prior to making the final decision to screen in/out

  – If additional clients were added to the referral after the score for that referral was last run

Information

STOP The Screening Score needs to be reviewed since the last client was added. Please click the button at the bottom of the Client Details section to review.

OK

How the Score will look to Call Screening

- When you click the FSS button in KIDS…

No Family Screening Score was found for this referral. Click the button below to recalculate the Screening Score.
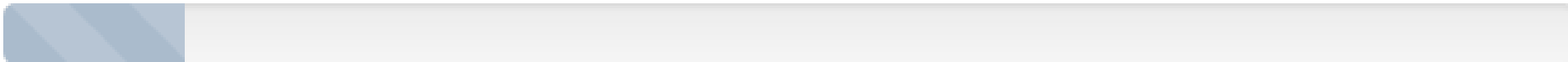
Recalculate Screening Score
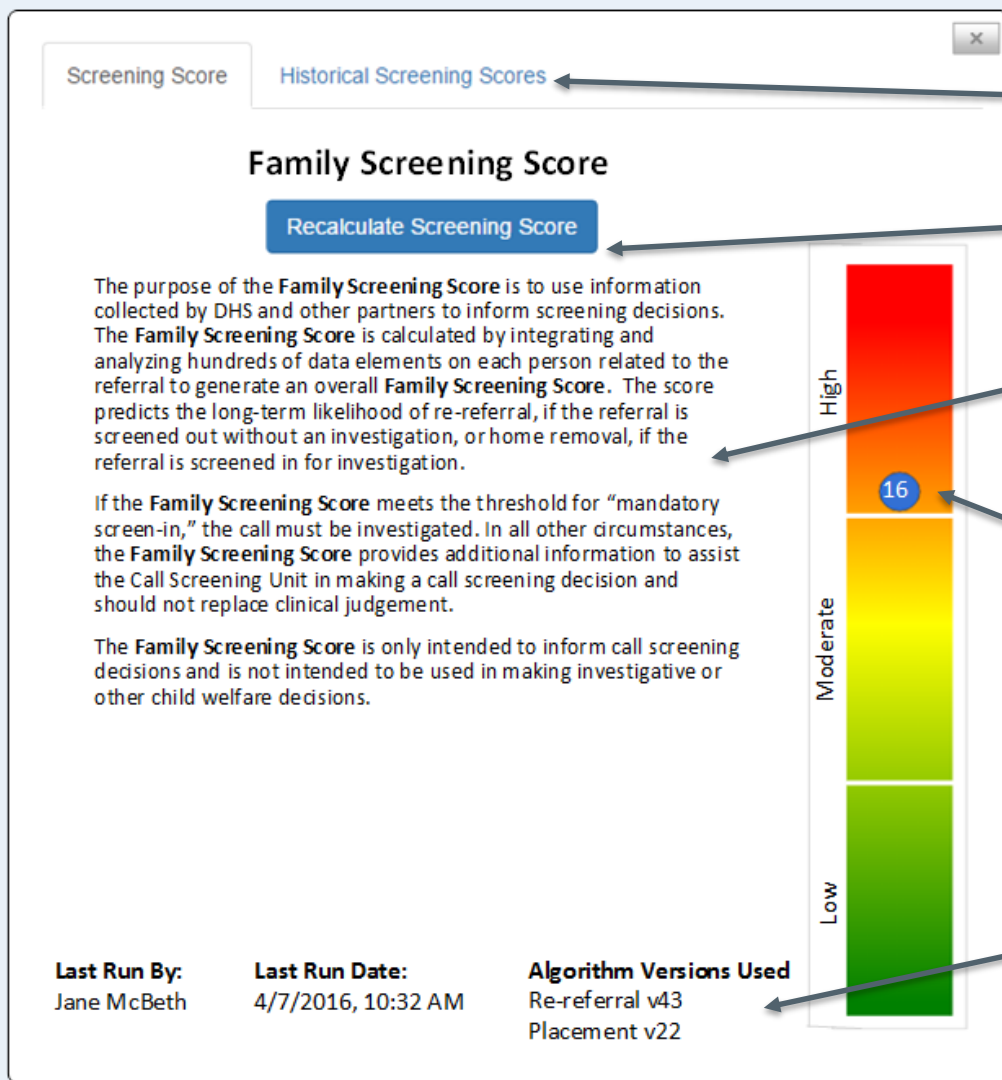
When the score is running…

No Family Screening Score was found for this referral. Click the button below to recalculate the Screening Score.

Algorithm running...Please wait

Recalculate Screening Score

How the Score will look to Call Screening

Screening Score | Historical Screening Scores

Family Screening Score

Recalculate Screening Score

The purpose of the **Family Screening Score** is to use information collected by DHS and other partners to inform screening decisions. The **Family Screening Score** is calculated by integrating and analyzing hundreds of data elements on each person related to the referral to generate an overall **Family Screening Score**. The score predicts the long-term likelihood of re-referral, if the referral is screened out without an investigation, or home removal, if the referral is screened in for investigation.

If the **Family Screening Score** meets the threshold for "mandatory screen-in," the call must be investigated. In all other circumstances, the **Family Screening Score** provides additional information to assist the Call Screening Unit in making a call screening decision and should not replace clinical judgement.

The **Family Screening Score** is only intended to inform call screening decisions and is not intended to be used in making investigative or other child welfare decisions.

High

Moderate

Low

16

Last Run By: Jane McBeth

Last Run Date: 4/7/2016, 10:32 AM

Algorithm Versions Used Re-referral v43 Placement v22

The display will default to the current score. You will click here to view previous scores for this family.

You will hit this button to re-run the score, if needed

This paragraph describing the purpose and use of the FSS will appear each time

The score will appear on this scale, inside a blue dot. Along the left hand side the words "low," "moderate," and "high" will appear. When the referral is a mandatory screen in, a new box will appear at the top of the scale (see subsequent slides).

Details will appear on the bottom regarding who ran the score, when it was run and the version of the model used in the last run of the score

How the Score will look to Call Screening

Text appearing on the thermometer:

The purpose of the Family Screening Score is to use information collected by DHS and other partners to inform screening decisions.   The Family Screening Score is calculated by integrating and analyzing hundreds of data elements on each person related to the referral to generate an overall Family Screening Score. The score predicts the long-term likelihood of re-referral, if the referral is screened out without an investigation, or home removal, if the referral is screened in for investigation.

If the Family Screening Score meets the threshold for "mandatory screen-in," the call must be investigated. In all other circumstances, the Family Screening Score provides additional information to assist the Call Screening Unit in making a call screening decision and should not replace clinical judgement.

The Family Screening Score is only intended to inform call screening decisions and is not intended to be used in making investigative or other child welfare decisions.

How the Score will look to Call Screening

Layout for a score that is not a mandatory screen in

Words to display	Min Score	Max Score
Low	1	9
Moderate	10	14
High	15	20

Screening Score   Historical Screening Scores

Family Screening Score

Recalculate Screening Score

The purpose of the **Family Screening Score** is to use information collected by DHS and other partners to inform screening decisions. The **Family Screening Score** is calculated by integrating and analyzing hundreds of data elements on each person related to the referral to generate an overall **Family Screening Score**. The score predicts the long-term likelihood of re-referral, if the referral is screened out without an investigation, or home removal, if the referral is screened in for investigation.

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High

16

Moderate

Low

Last Run By:	Last Run Date:	Algorithm Versions Used
Jane McBeth	4/7/2016, 10:32 AM	Re-referral v43 Placement v22

Layout for score that is a mandatory screen in

Screening Score | Historical Screening Scores

Family Screening Score

Recalculate Screening Score

The purpose of the **Family Screening Score** is to use information collected by DHS and other partners to inform screening decisions. The **Family Screening Score** is calculated by integrating and analyzing hundreds of data elements on each person related to the referral to generate an overall **Family Screening Score**. The score predicts the long-term likelihood of re-referral, if the referral is screened out without an investigation, or home removal, if the referral is screened in for investigation.

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The **Family Screening Score** is only intended to inform call screening decisions and is not intended to be used in making investigative or other child welfare decisions.

Mandatory Screen-In

High

Moderate

Low

Last Run By:
Jane McBeth

Last Run Date:
4/7/2016, 10:32 AM
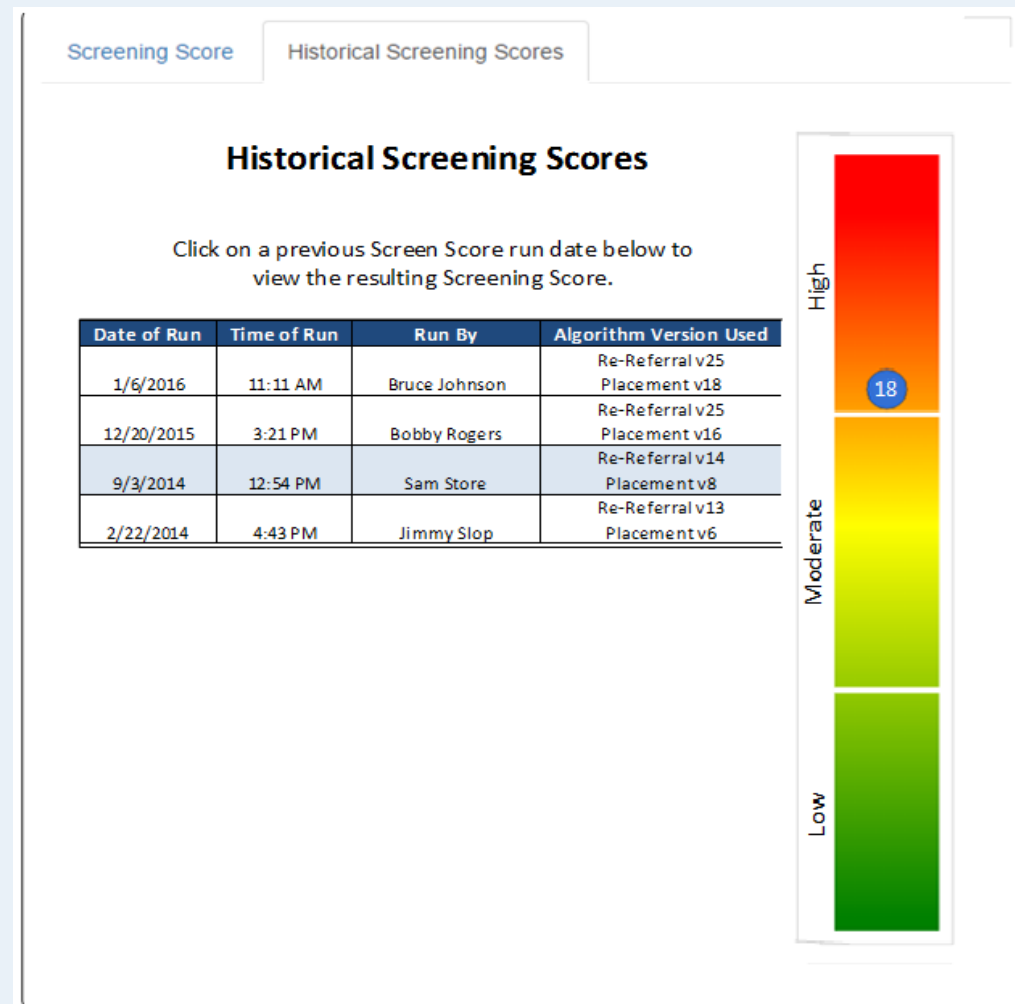
Algorithm Versions Used
Re-referral v43
Placement v22

Layout for score that cannot be generated

"Unable to recalculate score. No child or victim was found with an existing MCI ID"

Layout for historical scores screen

Each previous run has its own row that includes:
- Date score was run
- Time score was run
- Who ran the score
- Version of algorithm used

The row highlighted (in this case, the third row), will display the score that was associated with that run along the right hand side

Screening Score | Historical Screening Scores

Historical Screening Scores

Click on a previous Screen Score run date below to view the resulting Screening Score.

Date of Run	Time of Run	Run By	Algorithm Version Used
1/6/2016	11:11 AM	Bruce Johnson	Re-Referral v25 Placement v18
12/20/2015	3:21 PM	Bobby Rogers	Re-Referral v25 Placement v16
9/3/2014	12:54 PM	Sam Store	Re-Referral v14 Placement v8
2/22/2014	4:43 PM	Jimmy Slop	Re-Referral v13 Placement v6

Now we know what it is, we know what it will look like, we know how to run it.

But, how does it impact our decision making?

Let's look at some case scenarios...

- Referral date: 4/2015
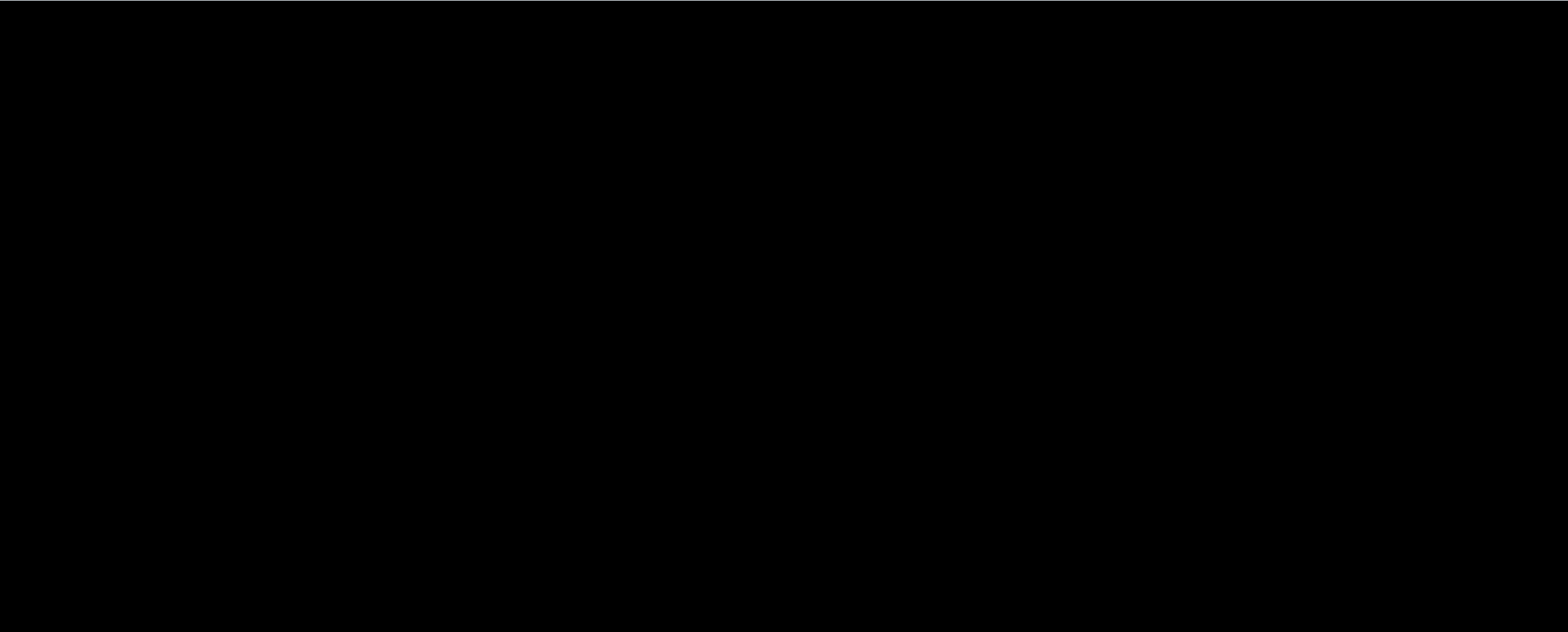
- You said we should:

- The screening score was:

- Does that change your decision?

15

High
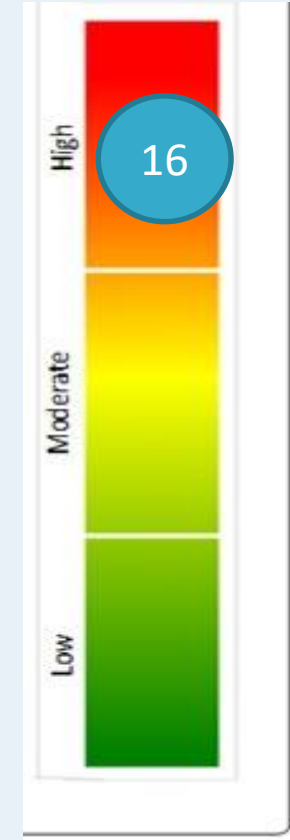
Moderate
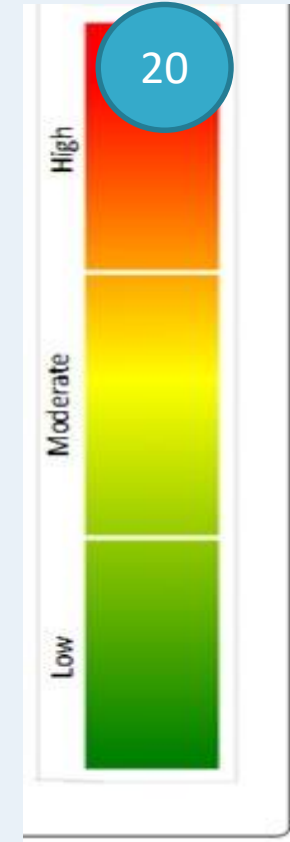
Low

- Referral date: 3/2016
-
-
-
-
-

37
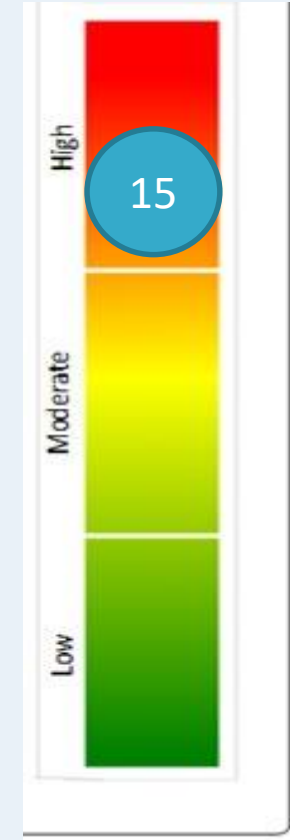
- You said we should:

- The screening score was:
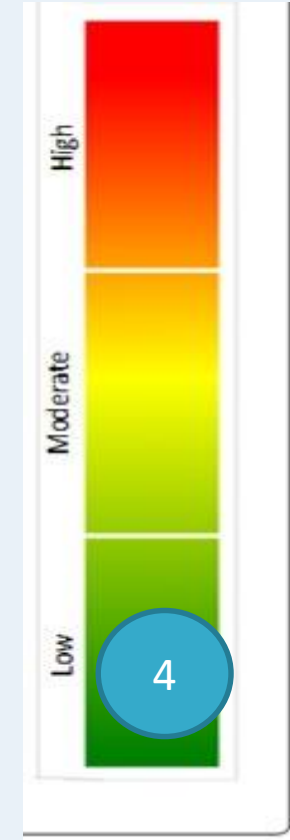
- Does that change your decision?

- Referral date: 11/2015.

- You said we should:

- The screening score was:

- Does that change your decision?

Case Scenario 4

- Referral date: 3/2014

- ███
  ██
  ███████████████████████████████████████
  ██████████████████████████████████

  - ██
  - ██
    ███████████████████████████████████████
    ██████████████
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  - ██████████████████████████████████████
    ████████████████████████

- You said we should:

- The screening score was:

- Does that change your decision?

- Referral date: 11/2015

- You said we should:

- The screening score was:

- Does that change your decision?
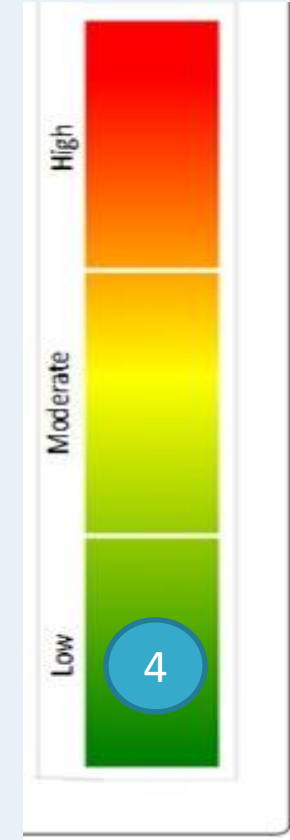
Case Scenario 6

- Referral date: 12/2015

- You said we should:

- The screening score was:

- Does that change your decision?

- Referral date: 4/2014

  - ██
    ██
    ████████████████████████████████

  - ██
    ██
    ██████████████████████████████

  - ███████████████████████████████████

  - ██
    ████████████

  - ███
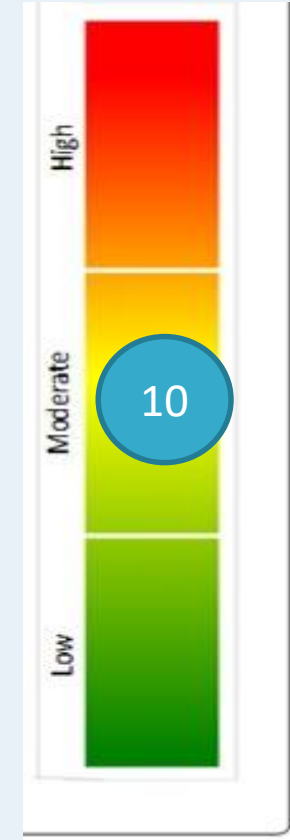
- You said we should:

- The screening score was:

- Does that change your decision?
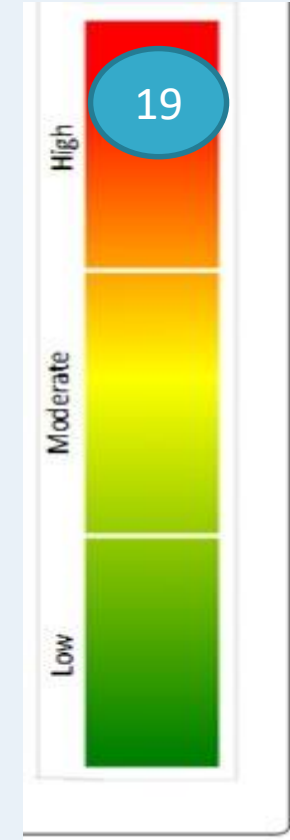
How Does this Change the Screening Process in KIDS?

Prior History | CYF Case History

Referral ID	Household Name	Referral Type	Staff Name	Open Date	Closed Date
591489	lkj	CPS		06/01/2016	
591791	Mand	GPS		06/28/2016	06/28/2016
591397	TEST	GPS		06/01/2016	
591436	ERROR	GPS		06/01/2016	
591444	Null	GPS		06/01/2016	
591437	Smoke	GPS		06/01/2016	
591401	Smoke	CPS		06/28/2016	
591390	smoke	CPS		05/30/2016	
591389	Smoke	CPS		05/31/2016	

Case ID	Household Name	Case Type	Staff Name	Open Date	Closed Date

Additional History

No changes were made to this section of the outcome screen

Call Screening Outcome Screen

Outcome

(Call Screener Findings

Risk Rating*

[Low Risk (L) ▼]

Basis for Risk Rating*

[   ]

Safety Rating*

[No safety threat ▼]

Basis for Safety Rating*

[   ]

Please review the Family Screening Score after entering the risk and safety ratings.*

[Family Screening Score]

Call Screener Recommendation*

[Accept for Investigation ▼]

Risk and Safety now follow the prior history section and are in a new section called "call screener findings."

This section will be completed by the call screener.

Risk and safety must be completed and explained before the FSS can be run.

Following FSS, the screener will make a recommendation for a screening decision

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Call Screening Outcome Screen

A new section called "predisposition" has been added to the outcome screen.

This section can be used to assign referrals to active workers or to move referrals to field screening.

Call Screening Outcome Screen

Disposition

⊙ Accept   [▾]

⊙ Screen Out   [▾]

Response Time*

○ Immediate

○ Priority (Within 24 hours)

○ Children born with Substance Exposure (Within 48 hours)

○ Expedited (Within 3-7 calendar days)

○ General/Other (Within 7-10 calendar days)

Mandatory Screen-In Override Reason

[text area]

Refer to Family and Community Teaming

[▾]

Client(s) to Contact

[text area]

Reason for Referral

[text area]

- Mandatory screen in override

  – This can be used only by the supervisor/ROD

  – That person will select screen out, but will not be able to enter the justification until they attempt to save the information

  – Upon saving, they will receive a pop up indicating that they've selected to screen out a mandatory screen in and will have to click "ok"

  – Following that, the supervisor must enter the justification for why the referral is being screened out

Call Screening Outcome Screen

Comments

Supervisor Comments

Assigned Staff Worker

Program Area   Unit

Save   Approval   Override   Cancel

One more thing…
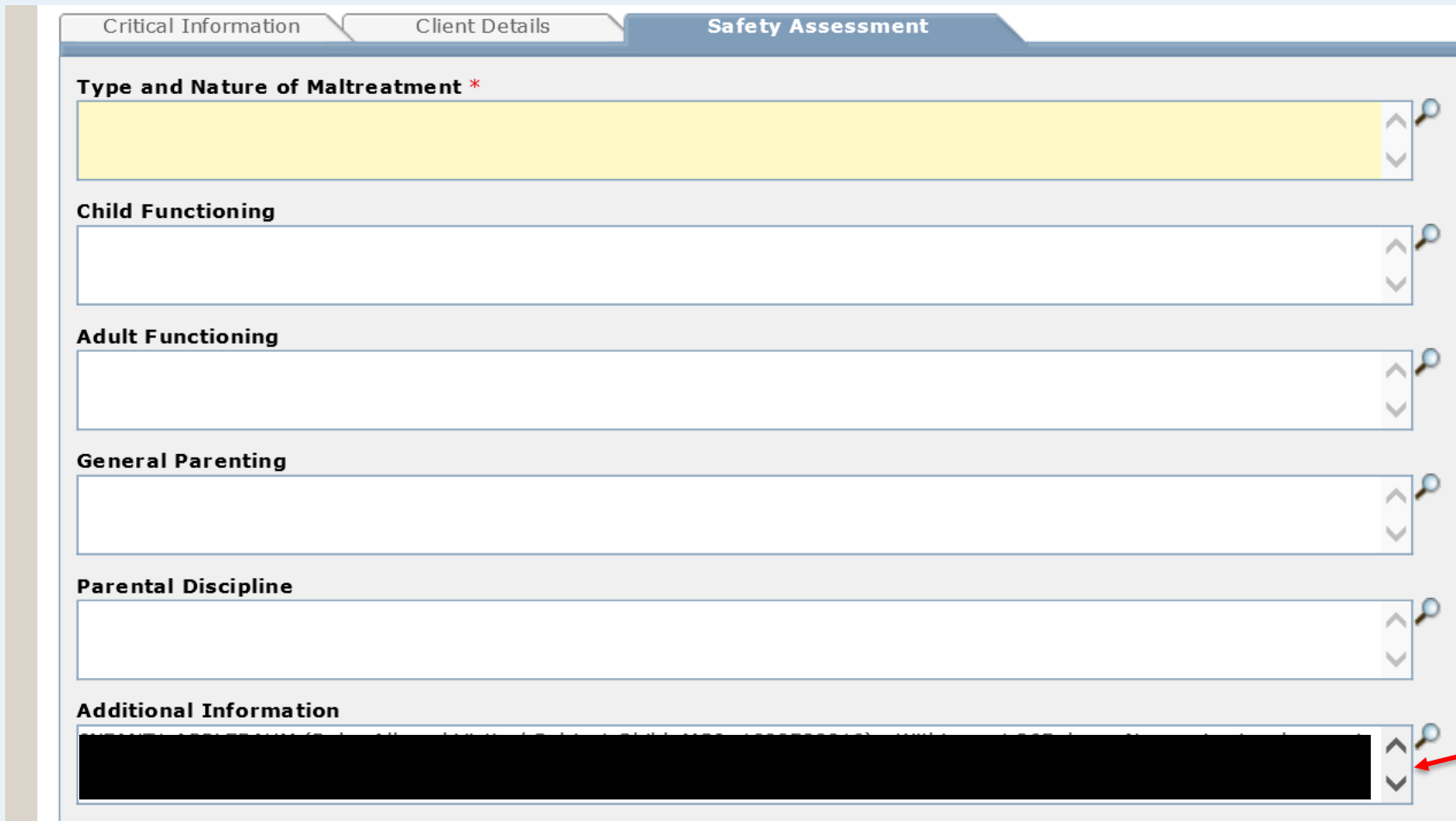
Client View Dynamic Text

- Though not a part of the Predictive Analytics changes, we are also introducing a new feature to KIDS at the same time as the FSS

- The dynamic text feature will import each client on a referral's information from Client View into the additional information section of the call information.

- The information included will be
  - Consistent across referrals to ensure all referrals have the same minimum Client View info included
  - High level to ensure that it does not replace the use of Client View when detail is needed

- All will follow this format:
  - [Name] (Role at intake, MCI ID) has accessed the following program areas within the past 365 days: [program areas]. There were [##] service entries, the earliest being [date] and the most recent being [date]. [Name] is listed as active in the following program areas: [program areas]. Previous history includes service access in [program areas] in [years].

Client View Dynamic Text

After adding a client, their information automatically populates into the additional information field

Client View Dynamic Text

Zoom Box

- Only includes information from Client View, not other resources that staff have access to (e.g., court records, criminal information)

Questions?